CLAIMS

What is claimed is:

1. A solar cell comprising:

a photovoltaic energy source having a front face and an oppositely disposed back face;

a frontside array of metallic gridlines deposited upon the front face of the photovoltaic energy source; and

a busbar structure in electrical continuity with the frontside array of metallic gridlines, the busbar structure comprising

an electrical insulator layer overlying and contacting the front face of the photovoltaic energy source, and

a metallic busbar layer overlying and contacting the electrical insulator layer, wherein the metallic busbar layer is in electrical continuity with the frontside array of metallic gridlines.

2. The solar cell of claim 1, wherein the photovoltaic energy source comprises exactly two layers of semiconductor material.

3. The solar cell of claim 1, wherein the photovoltaic energy source comprises more than two layers of semiconductor material.

4. The solar cell of claim 1, wherein the solar cell further includes

a backside metallic electrode overlying and contacting the back face of the photovoltaic energy source.

5. The solar cell of claim 1, wherein the electrical insulator layer is an oxide or a nitride.

6. The solar cell of claim 1, wherein the electrical insulator layer has a thickness of from about 0.3 to about 2 micrometers.

7. The solar cell of claim 1, wherein the electrical insulator layer has a thickness of about 0.5 micrometers.

8. The solar cell of claim 1, wherein the electrical insulator layer extends laterally beyond the metallic busbar layer.

9. The solar cell of claim 1, further including

a solar concentrator disposed to concentrate solar energy toward the front face of the photovoltaic energy source.

10. The solar cell of claim 1, further including

a solar concentrator disposed to concentrate solar energy toward the front face of the photovoltaic energy source with a concentration ratio of more than 200 suns.

11. The solar cell of claim 1, further including

a solar concentrator disposed to concentrate solar energy toward the front face of the photovoltaic energy source with a concentration ratio of from about 300 to about 500 suns.

12. A solar cell comprising:

a photovoltaic energy source comprising at least two layers of semiconductor material and having a front face and an oppositely disposed back face;

a solar concentrator disposed to concentrate solar energy toward the front face of the photovoltaic energy source;

a frontside array of metallic gridlines deposited upon the front face of the photovoltaic energy source;

a backside metallic electrode overlying and contacting the back face of the photovoltaic energy source;

a busbar structure in electrical continuity with the frontside array of metallic gridlines, the busbar structure comprising

an electrical insulator layer overlying and contacting the front face of the photovoltaic energy source, and

a metallic busbar layer overlying and contacting the electrical insulator layer, the metallic busbar layer being in electrical continuity with the frontside array of metallic gridlines.

13. The solar cell of claim 12, wherein the electrical insulator layer is an oxide.

14. The solar cell of claim 12, wherein the electrical insulator layer has a thickness of from about 0.3 to about 2 micrometers.

15. The solar cell of claim 12, wherein the electrical insulator layer has a thickness of about 0.5 micrometers.

16. The solar cell of claim 12, wherein the electrical insulator layer extends laterally beyond the metallic busbar layer.

17. The solar cell of claim 12, wherein

the solar concentrator has a concentration ratio of from about 300 to about 500 suns.